AUGMENTED REALITY PRESENTATION

BACKGROUND

A wide variety of physical items are available for acquisition through various online merchants. The items may include jewelry, eyeglasses, watches, home furnishings, and so forth. Users who wish to purchase these physical items may find that the experience of purchasing is enhanced by more realistic presentations of the physical items on devices.

BRIEF DESCRIPTION OF DRAWINGS

FIG. 1 is an illustrative system for providing an augmented reality presentation comprising an augmented image in a mirror mode which merges images of an actual background, actual objects, virtual items, and virtual reflections of the background on the virtual items.

FIG. 2 illustrates the virtual reflection in the mirror mode as configured to include an apparent image of a device providing the augmented image.

FIG. 3 illustrates the augmented reality presentation in a non-mirror mode which places the actual object between the background and the device.

FIG. 4 illustrates reflection of the background on a reflective surface of a physical item.

FIG. 5 illustrates a virtual reflection of the background from the reflective surface of a virtual item.

FIG. 6 illustrates a block diagram of the device which may be configured to provide the augmented image including the virtual reflection.

FIG. 7 is a flow diagram of a process of generating a virtual reflection.

FIG. 8 is a flow diagram of process of generating the virtual reflection based at least in part on an actual orientation of an actual object.

FIG. 9 is a flow diagram of process of generating an augmented image including images of the actual object, the virtual item, and the virtual reflection.

Certain implementations and embodiments will now be described more fully below with reference to the accompanying figures, in which various aspects are shown. However, various aspects may be implemented in many different forms and should not be construed as limited to the implementations set forth herein. Like numbers refer to like elements throughout.

DETAILED DESCRIPTION

As mentioned above, a wide variety of physical items are available for acquisition through various online merchants. Traditionally, customers buying the physical item have relied on one or more pictures of the item to attempt to visualize how the physical item would look in use. However, many users may have difficulty judging the appearance of the item as worn or used, based on the picture. Providing the actual physical item to the user imposes logistical issues, particularly in the case of an online merchant. In the traditional situation, the user is shipped a physical item for sale and returns the physical item if the fit or appearance is unsatisfactory. This increases shipping costs, delays, and may result in an unsatisfying user experience. Instead of, or in addition to shipping the physical item, a storefront may be maintained to provide access to samples of the physical items. However, maintaining the storefront imposes logistical issues and corresponding costs as well.

This disclosure describes techniques and devices configured to facilitate presentation to a user of virtual items representative of physical items. The presentation of the virtual items includes one or more virtual reflections based on a background of the device. A device presents, on a display, an augmented image which may include an image of an actual object and a generated image of a virtual item which includes one or more virtual reflections of a background. By providing the augmented image, the user may be better able to visualize the appearance, fit, and so forth, of the virtual item. This may reduce or eliminate the need or desire to inspect the physical item prior to purchase, reduce returns of ordered items, and so forth.

The actual object is a real object existing in the environment around the device. In one implementation, the actual object may be the user's hand, while the virtual item may be a wristwatch. The techniques described in this disclosure may be applied to other actual objects and virtual items. For example, the actual object may be a user's head, window, portion of a room, and so forth while the virtual item may be sunglasses, a window covering, piece of furniture, and so forth.

The physical item, and thus the virtual item which represents it, may include one or more reflective surfaces. For example, the physical item of a wristwatch offered for sale by a merchant may have a wristwatch face which is somewhat reflective at various incident angles. In another example, the surface of a polished wood table offered for sale may be reflective. Therefore, the virtual item, which is representative of the physical item, may be considered to have reflective surfaces as well. These reflective surfaces are virtual in that they have no physical manifestation. However they are representative of the physical item with corresponding reflective surfaces, upon which they are based.

The virtual item may be based on three-dimensional ("3D") data gathered about the physical item. The 3D data may be acquired using 3D sensors, cameras, and so forth which acquire information about a model or example of the physical item. The 3D data may also be acquired from computer-aided design files, materials databases, and so forth.

A camera obtains an image of the background relative to the device. For example, a rear-facing camera may acquire an image of the ambient environment behind the device. This background image is used to generate the virtual reflection using a bidirectional reflectance distribution function ("BRDF") or other function. The background image may be modified using this function, with the modification based at least in part on virtual relative angles between the one or more of the reflective surfaces of the virtual item and the apparent observer manipulating the device. The image of the background is used to generate the virtual reflection which is superimposed onto the one or more reflective surfaces of the virtual item during presentation of the augmented image. Continuing the example, the wristwatch face in the augmented image may appear to present the virtual item with the virtual reflection of the background.

In some implementations, the virtual reflection may also include an image of the device. For example, the augmented image may be presented in a "mirror mode" in which a front-facing camera is employed to acquire images of the actual objects and present a "mirrored" augmented image on the display. In this implementation, the virtual reflection may include a previously acquired image or other virtual representation of the device. When combined with the